

IN THE CLAIMS

Please amend the claims as follows:

Claim 1 (Currently Amended): A method of color displacement detection for use in a color image forming apparatus that sequentially forms image layers in different colors on a photosensitive member and overlays the image layers into a color image on a transferring member, comprising:

A forming a predetermined number of mark sets within one circumferential length surface of said transferring member, each of said predetermined number of mark sets including a predetermined number of different color marks arranged in a line in a moving direction of said transferring member, and each of said predetermined number of mark sets being formed within an area of one tenth of a circumferential length of said transferring member;

detecting said predetermined number of mark sets formed on said transferring member; and

calculating mean values of displacement amounts of same color marks in different mark sets in said predetermined number of mark sets relative to respectively corresponding reference positions.

Claim 2 (Original): A method as defined in Claim 1, wherein said forming forms said same color marks in said different mark sets included in said predetermined number of mark sets in a pitch of three fourth circumferential length of said photosensitive member.

Claim 3 (Original): A method as defined in Claim 1, wherein said predetermined number of mark sets is eight.

Claim 4 (Original): A method as defined in Claim 1, wherein said predetermined number of mark sets is four.

Claim 5 (Original): A method as defined in Claim 1, wherein said predetermined number of different color marks is four.

Claim 6 (Original): A method as defined in Claim 1, wherein said different colors include magenta, cyan, yellow, and black.

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Claim 7 (Original): A method as defined in Claim 1, further comprising:
converting a mark signal output from said detecting step into mark edge data with an A/D conversion using a predetermined pitch;
storing said mark edge data in association with respective scanning positions into a memory; and
generating information of mark distribution based on data groups of said mark edge data belonging to two adjacent scanning positions and to signal areas having levels with predetermined varying trends.

Claim 8 (Original): A color displacement detecting apparatus for use in a color image forming apparatus that sequentially forms image layers in different colors on a photosensitive member and overlays said image layers into a color image on a transferring member, said apparatus comprising:

a pattern generator configured to generate a test pattern including a predetermined number of mark sets within one circumferential length surface of said transferring member,

each of said predetermined number of mark sets including a predetermined number of different color marks arranged in a line in a moving direction of said transferring member;

a detector configured to detect marks included in said predetermined number of mark sets;

an A/D converter configured to convert a signal output from said detector into detection data; and

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a controller configured to control a storage operation for storing said detection data converted by said A/D converter in association with respectively corresponding scanning positions, to calculate positions of marks of said predetermined number of mark sets based on said detection data stored through said storage operation, and to calculate mean values of displacement amounts of same color marks in different mark sets in said predetermined number of mark sets relative to respectively corresponding reference positions.

Claim 9 (Original): An apparatus as defined in Claim 8, wherein said same color marks in said different mark sets included in said predetermined number of mark sets are formed in a pitch of three fourth circumferential length of said photosensitive member.

Claim 10 (Original): An apparatus as defined in Claim 8, wherein said predetermined number of mark sets is eight.

Claim 11 (Original): An apparatus as defined in Claim 8, wherein said predetermined number of mark sets is four.

Claim 12 (Original): An apparatus as defined in Claim 8, wherein said predetermined number of different color marks is four.

Claim 13 (Original): An apparatus as defined in Claim 8, wherein said different colors include magenta, cyan, yellow, and black.

Claim 14 (Original): A color displacement detecting apparatus for use in a color image forming apparatus that sequentially forms image layers in different colors on a photosensitive member and overlays said image layers into a color image on a transferring member, said apparatus comprising:

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pattern generating means for generating a test pattern including a predetermined number of mark sets within one circumferential length surface of said transferring member, each of said predetermined number of mark sets including a predetermined number of different color marks arranged in a line in a moving direction of said transferring member;

detecting means for detecting marks included in said predetermined number of mark sets;

converting means for converting a signal output from said detecting means into detection data;

controlling means for controlling a storage operation for storing said detection data converted by said converting means in association with respectively corresponding scanning positions, calculating positions of marks of said predetermined number of mark sets based on said detection data stored through said storage operation, and calculating average values of displacement amounts of same color marks in different mark sets in said predetermined number of mark sets relative to respectively corresponding reference positions.

Claim 15 (Original): An apparatus as defined in Claim 14, wherein said same color marks in said different mark sets included in said predetermined number of mark sets is formed in a pitch of three fourth circumferential length of said photosensitive member.

Claim 16 (Original): An apparatus as defined in Claim 14, wherein said predetermined number of mark sets is eight.

Claim 17 (Original): An apparatus as defined in Claim 14, wherein said predetermined number of mark sets is four.

Claim 18 (Original): An apparatus as defined in Claim 14, wherein said predetermined number of different color marks is four.

Claim 19 (Original): An apparatus as defined in Claim 14, wherein said different colors include magenta, cyan, yellow, and black.

Claim 20 (Original): A method of color displacement detection for use in a color image forming apparatus that sequentially forms image layers in different colors on a photosensitive member and overlays said image layers into a color image on a transferring member, said method comprising:

generating a test pattern including a predetermined number of mark sets within one circumferential length surface of said transferring member, each of said predetermined number of mark sets including a predetermined number of different color marks arranged in a line in a moving direction of said transferring member;

detecting marks included in said predetermined number of mark sets;

converting a signal output from said detecting into detection data;
storing said detection data converted by said converting in association with
respectively corresponding scanning positions;
calculating positions of marks of said predetermined number of mark sets based on
said detection data stored through said storing; and
performing a calculation of average values of displacement amounts of same color
marks in different mark sets in said predetermined number of mark sets relative to
respectively corresponding reference positions.

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Claim 21 (Original): A method as defined in Claim 20, wherein said same color
marks in said different mark sets included in said predetermined number of mark sets is
formed in a pitch of three fourth circumferential length of said photosensitive member.

Claim 22 (Original): A method as defined in Claim 20, wherein said predetermined
number of mark sets is eight.

Claim 23 (Original): A method as defined in Claim 20, wherein said predetermined
number of mark sets is four.

Claim 24 (Original): A method as defined in Claim 20, wherein said predetermined
number of different color marks is four.

Claim 25 (Original): A method as defined in Claim 20, wherein said different colors
include magenta, cyan, yellow, and black.

Claim 26 (Original): An image forming apparatus that sequentially forms image layers in different colors on a photosensitive member and overlays said image layers into a color image on a transferring member, said apparatus comprising:

an optical writing mechanism configured to write an image in accordance with image data on said transferring member; and

a color displacement detecting mechanism, comprising:

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a pattern generator configured to generate a test pattern including a predetermined number of mark sets within one circumferential length surface of said transferring member, each of said predetermined number of mark sets including a predetermined number of different color marks arranged in a line in a moving direction of said transferring member;

a detector configured to detect marks included in said predetermined number of mark sets;

an A/D converter configured to convert a signal output from said detector into detection data;

a controller configured to control a storage operation for storing said detection data converted by said A/D converter in association with respectively corresponding scanning positions, to calculate positions of marks of said predetermined number of mark sets based on said detection data stored through said storage operation, and to calculate mean values of displacement amounts of same color marks in different mark sets in said predetermined number of mark sets relative to respectively corresponding reference positions.

Claim 27 (Original): An apparatus as defined in Claim 26, wherein said same color marks in said different mark sets included in said predetermined number of mark sets is formed in a pitch of three fourth circumferential length of said photosensitive member.

Claim 28 (Original): An apparatus as defined in Claim 26, wherein said predetermined number of mark sets is eight.

Claim 29 (Original): An apparatus as defined in Claim 26, wherein said predetermined number of mark sets is four.

Claim 30 (Original): An apparatus as defined in Claim 26, wherein said predetermined number of different color marks is four.

Claim 31 (Original): An apparatus as defined in Claim 26, wherein said different colors include magenta, cyan, yellow, and black.

Claim 32 (Original): An image forming apparatus that sequentially forms image layers in different colors on a photosensitive member and overlays said image layers into a color image on a transferring member, said apparatus comprising:

optically writing means for writing an image in accordance with image data on said transferring member; and

color displacement detecting means, comprising:

pattern generating means for generating a test pattern including a predetermined number of mark sets within one circumferential length surface of said transferring member, each of said predetermined number of mark sets including a

predetermined number of different color marks arranged in a line in a moving direction of said transferring member;

detecting means for detecting marks included in said predetermined number of mark sets;

converting means for converting a signal output from said detecting means into detection data;

controlling means for controlling a storage operation for storing said detection data converted by said converting means in association with respectively corresponding scanning positions, calculating positions of marks of said predetermined number of mark sets based on said detection data stored through said storage operation, and calculating average values of displacement amounts of same color marks in different mark sets in said predetermined number of mark sets relative to respectively corresponding reference positions.

Claim 33 (Original): An apparatus as defined in Claim 32, wherein said same color marks in said different mark sets included in said predetermined number of mark sets is formed in a pitch of three fourth circumferential length of said photosensitive member.

Claim 34 (Original): An apparatus as defined in Claim 32, wherein said predetermined number of mark sets is eight.

Claim 35 (Original): An apparatus as defined in Claim 32, wherein said predetermined number of mark sets is four.

Claim 36 (Original): An apparatus as defined in Claim 32, wherein said predetermined number of different color marks is four.

Claim 37 (Original): An apparatus as defined in Claim 32, wherein said different colors include magenta, cyan, yellow, and black.

Claim 38 (Original): A method of image forming that sequentially forms image layers in different colors on a photosensitive member and overlays said image layers into a color image on a transferring member, said method comprising:

providing an optical writing mechanism for writing an image in accordance with image data on said transferring member; and

executing a color displacement detection, said executing comprising:

generating a test pattern including a predetermined number of mark sets within one circumferential length surface of said transferring member, each of said predetermined number of mark sets including a predetermined number of different color marks arranged in a line in a moving direction of said transferring member;

detecting marks included in said predetermined number of mark sets;

converting a signal output from said detecting into detection data;

storing said detection data converted by said converting in association with respectively corresponding scanning positions;

calculating positions of marks of said predetermined number of mark sets based on said detection data stored through said storing; and

performing a calculation of average values of displacement amounts of same color marks in different mark sets in said predetermined number of mark sets relative to respectively corresponding reference positions.

Claim 39 (Original): A method as defined in Claim 38, wherein said same color marks in said different mark sets included in said predetermined number of mark sets is formed in a pitch of three fourth circumferential length of said photosensitive member.

Claim 40 (Original): A method as defined in Claim 38, wherein said predetermined number of mark sets is eight.

Claim 41 (Original): A method as defined in Claim 38, wherein said predetermined number of mark sets is four.

Claim 42 (Original): A method as defined in Claim 38, wherein said predetermined number of different color marks is four.

Claim 43 (Original): A method as defined in Claim 38, wherein said different colors include magenta, cyan, yellow, and black.

Claim 44 (New): A method of color displacement detection for use in a color image forming apparatus that sequentially forms image layers in different colors on a photosensitive member and overlays the image layers into a color image on a transferring member, comprising:

forming a predetermined number of mark sets within one circumferential length surface of said transferring member, each of said predetermined number of mark sets including a predetermined number of different color marks arranged in a line in a moving direction of said transferring member;

detecting said predetermined number of mark sets formed on said transferring member; and

calculating mean values of displacement amounts of same color marks in different mark sets in said predetermined number of mark sets relative to respectively corresponding reference positions,

wherein said forming forms said same color marks in said different mark sets included in said predetermined number of mark sets in a pitch of three fourth circumferential length of said photosensitive member.

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Claim 45 (New): A method of color displacement detection for use in a color image forming apparatus that sequentially forms image layers in different colors on a photosensitive member and overlays the image layers into a color image on a transferring member, comprising:

forming a predetermined number of mark sets within one circumferential length surface of said transferring member, each of said predetermined number of mark sets including a predetermined number of different color marks arranged in a line in a moving direction of said transferring member;

detecting said predetermined number of mark sets formed on said transferring member; and

calculating mean values of displacement amounts of same color marks in different mark sets in said predetermined number of mark sets relative to respectively corresponding reference positions,

wherein said predetermined number of mark sets is eight.

Claim 46 (New): A method of color displacement detection for use in a color image forming apparatus that sequentially forms image layers in different colors on a photosensitive member and overlays the image layers into a color image on a transferring member, comprising:

forming a predetermined number of mark sets within one circumferential length surface of said transferring member, each of said predetermined number of mark sets including a predetermined number of different color marks arranged in a line in a moving direction of said transferring member;

detecting said predetermined number of mark sets formed on said transferring member; and

calculating mean values of displacement amounts of same color marks in different mark sets in said predetermined number of mark sets relative to respectively corresponding reference positions,

wherein said predetermined number of mark sets is four.

Claim 47 (New): A method of color displacement detection for use in a color image forming apparatus that sequentially forms image layers in different colors on a photosensitive member and overlays the image layers into a color image on a transferring member, comprising:

forming a predetermined number of mark sets within one circumferential length surface of said transferring member, each of said predetermined number of mark sets including a predetermined number of different color marks arranged in a line in a moving direction of said transferring member;

detecting said predetermined number of mark sets formed on said transferring member; and

calculating mean values of displacement amounts of same color marks in different mark sets in said predetermined number of mark sets relative to respectively corresponding reference positions,

wherein said predetermined number of different color marks is four.

Claim 48 (New): A method of color displacement detection for use in a color image forming apparatus that sequentially forms image layers in different colors on a photosensitive member and overlays the image layers into a color image on a transferring member, comprising:

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(prior art)

forming a predetermined number of mark sets within one circumferential length surface of said transferring member, each of said predetermined number of mark sets including a predetermined number of different color marks arranged in a line in a moving direction of said transferring member;

detecting said predetermined number of mark sets formed on said transferring member;

calculating mean values of displacement amounts of same color marks in different mark sets in said predetermined number of mark sets relative to respectively corresponding reference positions;

converting a mark signal output from said detecting step into mark edge data with an A/D conversion using a predetermined pitch;

storing said mark edge data in association with respective scanning positions into a memory; and

generating information of mark distribution based on data groups of said mark edge data belonging to two adjacent scanning positions and to signal areas having levels with predetermined varying trends.